WHAT IS CLAIMED IS:

1. A microfluidic device for separating particles according to size comprising

   a microfluidic channel, and

   an array comprising a network of gaps within the microfluidic channel, wherein the device employs a field that propels the particles being separated through the microfluidic channel; and wherein

   a flux of the field from the gaps is divided unequally into a major flux component and a minor flux component into subsequent gaps in the network such that the average direction of the major flux components is not parallel to the average direction of the field.

2. The microfluidic device of claim 1, wherein the array is an ordered array of obstacles.

3. The microfluidic device of claim 2, wherein the ordered array of obstacles comprises obstacles arranged in rows, wherein each subsequent row of obstacles is shifted laterally with respect to the previous row.

4. The microfluidic device of claim 2, wherein the ordered array of obstacles is tilted at an offset angle θ with respect to the direction of the field.

5. The microfluidic device of claim 1, wherein. the field is fluid flow, electrical, electrophoretic, electro-osmotic, centrifugal, gravitational, hydrodynamic, pressure gradient, or capillary action.

6. The microfluidic device of claim 5, wherein the field is a fluid flow.

7. The microfluidic device of claim 5, wherein the field is an electrical field.

8. The microfluidic device of claim 1, wherein the particles are bacteria, cells, organelles, viruses, nucleic acids, proteins, protein complexes, polymers, powders, latexes, emulsions, or colloids.

9. The microfluidic device of claim 1, wherein the particles are DNA molecules.

10. A microfluidic device for separating particles according to size comprising
a microfluidic channel, and
an ordered array of obstacles within the microfluidic channel, wherein
the device employs a field that propels the particles being separated through the microfluidic channel; and
the ordered array of obstacles is asymmetric with respect to the average direction of the field.

11. The microfluidic device of claim 10, wherein the ordered array of obstacles comprises obstacles arranged in rows, wherein each subsequent row of obstacles is shifted laterally with respect to the previous row.

12. The microfluidic device of claim 10, wherein the ordered array of obstacles is tilted at an offset angle θ with respect to the direction of the field.

13. The microfluidic device of claim 10, wherein the field is fluid flow, electrical, electrophoretic, electro-osmotic, centrifugal, gravitational, hydrodynamic, pressure gradient, or capillary action.

14. The microfluidic device of claim 13, wherein the field is a fluid flow.

15. The microfluidic device of claim 13, wherein the field is an electrical field.

16. The microfluidic device of claim 10, wherein the particles are bacteria, cells, organelles, viruses, nucleic acids, proteins, protein complexes, polymers, powders, latexes, emulsions, or colloids.

17. The microfluidic device of claim 16, wherein the particles are DNA molecules.

18. A method for separating particles according to size comprising:
introducing the particles to be separated into a microfluidic channel comprising a network of gaps within the microfluidic channel; and
applying a field to the particles to propel the particles through the microfluidic channel,
wherein a flux of the field from the gaps is divided unequally into a major flux component and a minor flux component into subsequent gaps in the network such that the average direction of the major flux components is not parallel to the average direction of the field.

19. The method of claim 18, wherein the network of gaps is constructed from an array of obstacles.

20. The method of claim 19, wherein the array of obstacles is an ordered array of obstacles.

21. The method of claim 20, wherein the ordered array of obstacles comprises obstacles arranged in rows, wherein each subsequent row of obstacles is shifted laterally with respect to the previous row.

22. The method of claim 20, wherein the ordered array of obstacles is tilted at an offset angle θ with respect to the direction of the field.

23. The method of claim 18, wherein the field is fluid flow, electrical, electrophoretic, electro-osmotic, centrifugal, gravitational, hydrodynamic, pressure gradient, or capillary action.

24. The method of claim 23, wherein the field is a fluid flow.

25. The method of claim 23, wherein the field is an electrical field.

26. The method of claim 18, wherein the particles are bacteria, cells, organelles, viruses, nucleic acids, proteins, protein complexes, polymers, powders, latexes, emulsions, or colloids.

27. The method of claim 26, wherein the particles are DNA molecules.

28. A method for separating particles according to size comprising:

introducing the particles to be separated into a microfluidic channel comprising an ordered array of obstacles; and

applying a field to the particles to propel the particles through the microfluidic channel,

wherein the ordered array of obstacles is asymmetric with respect to the average direction of the field.

29. The method of claim 28, wherein the ordered array of obstacles comprises obstacles arranged in rows, wherein each subsequent row of obstacles is shifted laterally with respect to the previous row.

30. The method of claim 28, wherein the ordered array of obstacles is tilted at an offset angle θ with respect to the direction of the field.

31. The method of claim 28, wherein the field is fluid flow, electrical, electrophoretic, electro-osmotic, centrifugal, gravitational, hydrodynamic, pressure gradient, or capillary action.

32. The method of claim 31, wherein the field is a fluid flow.

33. The method of claim 31, wherein the field is an electrical field.

34. The method of claim 28, wherein the particles are bacteria, cells, organelles, viruses, nucleic acids, proteins, protein complexes, polymers, powders, latexes, emulsions, or colloids.

35. The microfluidic device of claim 34, wherein the particles are DNA molecules.

36. A microfluidic device for separating particles according to size comprising

a microfluidic channel, and

multiple arrays in series within the microfluidic channel, wherein each array has a different critical size,

and wherein

the device employs a field that propels the particles being separated through the microfluidic channel;

each array comprises a network of gaps wherein a flux of the field from the gaps is divided unequally into a major flux component and a minor flux component into subsequent gaps in the network such that the average direction of the major flux components in each array is not parallel to the average direction of the field.

37. The microfluidic device of claim 36, wherein each array is an ordered array of obstacles.

38. The microfluidic device of claim 37, wherein the ordered arrays of obstacles comprise obstacles arranged in rows, wherein each subsequent row of obstacles is shifted laterally with respect to the previous row.

39. The microfluidic device of claim 2, wherein the ordered arrays of obstacles are tilted at an offset angle θ with respect to the direction of the field.

40. The microfluidic device of claim 36, wherein the field is fluid flow, electrical, electrophoretic, electro-osmotic, centrifugal, gravitational, hydrodynamic, pressure gradient, or capillary action.

41. The microfluidic device of claim 40, wherein the field is a fluid flow.

42. The microfluidic device of claim 40, wherein the field is an electrical field.

43. The microfluidic device of claim 36, wherein the particles are bacteria, cells, organelles, viruses, nucleic acids, proteins, protein complexes, polymers, powders, latexes, emulsions, or colloids.

44. The microfluidic device of claim 43, wherein the particles are DNA molecules.